REMARKS

Applicants have thoroughly considered the Office action dated August 8, 2006 and have amended the application to more clearly set forth the invention. Applicants' attorney appreciated the opportunity to discuss the application with the Examiner on October 16, 2006. Although there was no agreement reached, the amendments and following remarks summarize and supplement the interview. Claims 1, 3, 8, 14-16, 26, 50, and 52-54 have been amended and claims 23-25, 51, and 59-61 have been canceled by this Amendment C. Claims 1, 3, 8, 14-22, 26, 50 52-58, and 62 are thus presented in the application for further examination. Reconsideration of the application as amended and in view of the following remarks is respectfully requested.

Claim Rejections under 35 U.S.C. 112

Claims 1, 3, 8, 14-26, and 50-62 stand rejected under 35 U.S.C. 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. In particular, the Office asserts "optimizing," "optimizing parameter," "actual," "assumed operation parameters," "actual operating parameter," or "optimize." As an initial matter, applicants have canceled claims 23, 24, 59-61 and, thus the terms "assumed operating parameters" and "actual operating parameters" no longer appear in the claims. Also, applicants have deleted terms "optimization parameter" from claims 14, 15, 16, 22, 51, 52 and 53.

With respect to the term "optimizing" or "optimize" the specification clearly provides that the invention relates to optimizing railway operations, and more particularly to a system and method of optimizing railway operations using a multi-level, system-wide approach. (See application page 1, paragraph 0002). As described in the present application, and shown in FIG. 1 of the present application, the multi- a railway system 50 comprises from the highest level to the lowest level: a railroad infrastructure level 100, a track network level 200, a train level 300, a consist level 400 and a locomotive level 500. Each level of a multi-level railway system "has its own unique operating characteristics, constraints, key operating parameters and optimization logic. Moreover, each level interacts in a unique manner with related levels, with different data

being interchanged at each interface between the levels so that the levels can cooperate to optimize the overall railway system 50. (See application page 5, paragraph 0036).

Nonetheless, applicants have amended the claims to more clearly set forth the invention. In particular, applicants have removed the terms "optimize," "optimized," and "optimizing" from claims 1, 14, 26, 50, 51, and 62. As such applicants submit that claims 1, 3, 8, 14-26, and 50-62 are in compliance with the second paragraph of 35 U.S.C. 112.

The Office further references MPEP 2173.05 (c) as a basis for rejecting claim 1. In particular, according to the Office, "claim 1 recites a broad recitation said infrastructure level containing one or more railroad track network levels and the claim also recites said railroad track network level containing one or more train levels, which is the narrower statement of the range/limitation." (See Office action at page 3). MPEP 2173.05 (c) provides that "use of a ***narrow numerical range*** that falls within a broader range in the same claim may render the claim indefinite when the boundaries of the claim are not discernible." However, as applicants' attorney pointed out during the interview with the Examiner, the infrastructure level, railroad track level, train level, consist level, and locomotive level are not ranges or numerals, but rather describe components of a multi-level rail system. Applicants submit that amended claim 1 clearly defines the relationship between the various operational levels of a multi-level rail system as described and illustrated in the application, and respectfully request that the rejection of claim based on MPEP 2173.05 (c) be removed. Claims 14 and 50 are believed to be in compliance with MPEP 2173.05 (c) for substantially same reasons as claim 1. Accordingly applicants submit that claims 1, 3, 8, 14-26, 60-62 particularly point out and distinctly claim the subject matter applicants regard as the invention.

The Office further asserts that it is not clear how the track layout described as a feature of the railroad track network level is described as containing one or more train levels wherein the train level contains one or more consist levels; wherein the consist levels contain one or more locomotives. (See Office action at page 4). As discussed during the interview, persons of ordinary skill in the art understand that a railway system comprises an infrastructure which includes railroad tracks, and that railroad tracks can contain trains, and that trains can contain a consist, and that a consist can contain one or more locomotives. Moreover, applicants have described and illustrated these components in terms of levels of a multi-level railway system. (See FIGS. 2, 5, 10, 12, and 15).

The Office also asserts that it is not understood how "awards for timely delivery," "weather conditions," described as features of the railroad infrastructure contain "the track layout," a feature of the railroad track network level, etc. (See Office action at page 4). Applicants point out the Office has incorrectly described teachings of the present application. As disclosed in the present application "the infrastructure level 100 contains other internal features **and functions** that are not shown, such as servicing facilities, service sidings, fueling depots, wayside equipment, rail yards, train crews operations, destinations, loading equipment (often referred to as pickups), unloading equipment (often referred to as set-outs), and **access to data that impacts the infrastructure**, such as: railroad operating rules, weather conditions, rail conditions, **business objective functions (**including costs, such as penalties for delays and damages enroute, and **awards for timely delivery)**, natural disasters, and governmental regulatory requirements. These are features **and functions** that are contained at the railroad infrastructure level 100." (See application page 6, paragraph 37). The application clearly describes the weather conditions and awards for timely delivery as accessible data that impacts the infrastructure and not as features of a railroad infrastructure level.

In view of the above, applicants submit that the specification is clear in determining the metes and bounds of amended claim 1.

With respect to claim 3, the Office states "it is not clear what all is meant and encompassed by "based at least in part thereon." Applicants have removed these terms from claim 3. Applicants note that the term "thereon" was deleted from claim 3 by the amendments to the claims presented in Amendment B filed on May 15, 2006.

Claim Rejections under 35 U.S.C. 102

Claims 1, 3, 8, 14-26, 50-62 stand rejected as being anticipated by U.S. Patent No. 5,828,979 to Polivka et al. (Polivka). However, a claim is anticipated only if each and every element as set forth in the claim is disclosed, either expressly or inherently, in a single prior art reference. Verdegal Bros. v. Union Oil. Of California, 814 F.2d 628, 631 (Fed. Cir.1987). Applicants submit that each and every element as set forth in claims 1, 3, 8, 14-26, 50-62 is not found, either expressly or inherently, in Polivka. Thus, the cited reference does not anticipate the claimed invention.

Polivka discloses a system for controlling the "movement of plural trains through a network of track in a multiple route railway system, and more particularly to a method and system of controlling the movement of a lengthy freight train in which the train movements are precisely monitored and orchestrated in accordance with a dynamic schedule that is determined through an evaluation of, inter alia, delivery schedule requirements, coordination among all trains, applicable speed restrictions and the effects of the track topography and train consist on train response to brake and power applications." (See Polivka column 1, lines 7-19). For example, as described in Polivka, "a train controller 208 aboard each train controls the train in accordance with a movement plan which is based upon a high-fidelity model of a railroad. The train's portion of the movement plan (e.g. its trip plan) may include a route (a list of track segments over which the train will pass) and the estimated time of arrival (ETA) and estimated time of departure (ETD) for each station along the route, and perhaps the velocity of the train at that point. In addition, a train's trip plan may contain an identification of the areas in which speed will be restricted due to the anticipated presence of other trains, or other factors. The train's trip plan may include data regarding each station of significance (e.g., a location and time at which a train must meet, pass, or merge with another train, stop for car pickups or setouts, crew changes, or termination of the trip). Polivka does disclose a positive train separation system PTS system of the present invention may include a dispatch center 602 for controlling freight train movement over a network of track, an onboard computer (OBC) 604 on each ***train to be controlled***, and an infrastructure 606 for communication between dispatch center 602 and OBC 604. However, the purpose of the dispatch center 602 is for controlling freight train movement over a network of track by controlling the onboard computer 604. (See column 8, lines 56-64). In other words, the dispatch center is essentially a remote control device for controlling movement of the train. Moreover, the infrastructure 606 disclosed in Polivka refers to the structure of a communication system and not the structure of a railway system.

In contrast, the present application discloses a system for controlling the operation of various operational levels of a multi-level rail system by exchanging data between each of the various levels of a multi-level railway system. A railway system has a multi-level or hierarchal structure. For example, an infrastructure level 100 of the multi-level railway system refers to, for example, maintenance facilities and service sidings. Infrastructure data includes facility location, facility capabilities (both static characteristics such as the number of service bays, as well as

dynamic characteristics, such as the availability of bays, service crews, and spare parts inventory), facility costs (such as hourly rates, downtime requirements), and the earlier noted data such as weather conditions, natural disaster and business objective functions. The next level below the infrastructure level is the track network level. The railroad track network level refers to, for example, the track layout (e.g., the path or route of one or more tracks), but also plans for movement of one or more trains over the track layout. (See application, paragraph 0042). As described and claimed in the present application, a processor associated with each of the various levels receives input data from within the associated level and from each of the other levels and uses this information to optimize operations within the associated level. Moreover, the processor associated with each of the various levels is responsive to the received input from within the associated level to provide commands and/or data to each of the various levels. The following are examples from the present application describing the optimization of operations within the associated level and the exchange of commands and data between the various levels.

INFRASTRUCTURE LEVEL

The infrastructure processor 202 analyzes this input data and optimizes the railroad infrastructure level 100 operation by issuing work orders or other instructions to the service facilities for the particular trains to be serviced, as indicated in block 226, which includes instructions for preparing for the work to be done such as scheduling work bays, work crews, tools, and ordering spare parts. The infrastructure level 100 also provides instructions that are used by the lower level systems. For example, track commands 228 are issued to provide data to revise the train movement plan in view of a service plan, advise the rail yard of the service plan such as reconfiguring the train, and provide substitute power of a replacement locomotive. Train commands 230 are issued to the train level 300 so that particular trains that are to be serviced may have restricted operation or to provide on-site servicing instructions that are a function of the service plan. (See application page 8, paragraph 39).

TRACK NETWORK LEVEL

The railroad track network level functionality established by the movement planner 702 includes determination of required consist power as a function of speed under current or projected operating conditions, and determination of fuel consumption as a function of power,

locomotive type, and network track. The movement planner 702 determinations may be for locomotives, for the consist or the train which would include the assigned load. (See application page 14, paragraph 54). A movement plan output from the track network level 200 specifies where and when to stop for fuel, amount of fuel to take on, lower and upper speed limits for train, time/speed at destination, and time allotted for fueling. (See application page 15, paragraph 56).

TRAIN LEVEL

The input data at the train level 300, as shown in Fig. 10 and 11, includes infrastructure data 1006, railway track network data 1008, train data 1010, including feedback from the train, and consist level data 1012. The output of the train level includes data sent to the infrastructure level 1026 and to the track network level 1028, optimization within the train level 1030 and commands to the consist level 1032. (See application page 15, paragraph 58). Optimizing performance within the train level 300 includes distributing power to the consists within the train level, distributing dynamic braking loads to the consists levels within the train level and pneumatic braking to the cars within the train level, and wheel adhesion of the consists and railroad cars. (See application page 17, paragraph 63).

CONSIST LEVEL

As shown in Fig. 12, the inputs to the consist level, as depicted in the consist level 400 with optimization algorithms, include data 1210 from the train level 300, data 1214 from the locomotive level 500 and data 1212 from the consist level 400. The outputs include data 1230 to the train level 300, commands 1234 to the locomotive level 500, and optimization 1232 within the consist level 400. (See application page 18, paragraph 64). Optimization within the consist considers factors such as fuel efficiency, consumable availability and equipment/subsystem status. For example, if the current demand is for 50% horsepower for the whole consist (prior art consists have all of the locomotives at the same power, here at 50% horsepower for each), it may be more efficient to operate some locomotives at less than a 50% horsepower rating and other locomotives at more than a 50% horsepower rating so that the total power generated by the consist equals the operator demand. (See application page 24, paragraph 93).

LOCOMOTIVE LEVEL

The input data to the locomotive level includes consist level data 1512 and data 1514 from the locomotive level (including locomotive feedback). The output from the locomotive level includes data 1532 to the consist level and optimization of performance data 1534 at the locomotive level. The data output 1532 to the consist level include locomotive health, friction management, notch setting, and fuel usage, level and range. The locomotive optimization commands 1534 to the locomotive subsystems include engine speed to the engine, engine cooling for the cooling system for the engine, DC link voltage to the inverters, torque commands to the traction motors, and electric power charging and usage from the electric power storage system of hybrid locomotives. (See application page 29, paragraph 118).

To this end, claim 1 recites, in part, "a first processor associated with a railroad infrastructure level ...," "a second processor associated with a railroad track network level," "a third processor associated with a train level ...," "a fourth processor associated with a consist level ..., " "a fifth processor associated with a locomotive level," "each processor associated with each level receiving input data defining operational characteristics and performance data for the associated level wherein each processor is responsive to the received input data to generate output instructions, and wherein each processor controls the operation in the associated level in accordance with the generated output instructions," and "each processor further generating operating commands and parameter data and providing the generated command and parameter data to a processor associated with at least one other level, and wherein the processor associated with the at least one other level is responsive to the received generated operating commands and parameter data to control an operation across all the levels of the railway system as a function of the generated command data." Polivka fails to teach or suggest a processor associated with a level of a multi-level railway system generating optimization instructions and controlling the operation within the associated level in accordance with the generated optimization instruction. Moreover, Polivka fails to teach or suggest each processor generating operating commands and parameter data exchanging the generated operating commands and parameter data with a processor associated with a different level of a multi-level railway system to control an operation of the multi-level railway system across all the levels of the railway system as claimed and described in the present application. Accordingly, Polivka fails to anticipate amended claim 1.

Amended claim 14 recites, in part, a multi-level system for management of a railway system and its operational components that includes "a first level configured to control an operation within the first level," "a second level configured to control an operation within the second level, ... wherein the second level is a sub-level of said first level," "said first level providing the second level with the first level operational parameters, and the second level providing the first level with the second level operational parameters," and "said controlling the operation within the first level and said controlling the operation within the second level each being a function of the first and second level operational parameters." Amended claim 50 recites a system for management of a multi-level railway system and its operational components that includes "a first level including first level operational parameters defining changes in operational characteristics and data of the first level over a period of time, and "a second level including second level operational parameters configured to control an operation within the second level as a function of the first level operational parameters and second level operational parameters and wherein the second level operational parameters are indicative of changes in operational characteristics and data of the second level over a period of time, wherein the second level is a sub-level of said first level." Polivka fails to teach or suggest controlling the operation within a first level and/or the second level of a multi-level railway system as a function of first and second level operational parameter. Accordingly, Polivka fails to anticipate amended claims 14 and 50.

As amended applicants submit that claims are distinguishable from the prior art both in terms of functions and structure. As described above the structure of system disclosed in Polivka does include processors associated with each of the various levels of a railway system nor does it discloses that each processor level interacts with other levels, with different data being interchanged at each interface between the levels so that the levels can cooperate to control operations of the overall railway system 50.

In view of the foregoing, applicants submit that amended claims 1, 14, and 50 are allowable over the cited art. The remaining dependent claims are believed to be allowable for at least the same reasons as the independent claims from which they depend.

It is felt that a full and complete response has been made to the Office action, and applicants respectfully submit that pending claims 1, 3, 8, 14-22, 26, 50 52-58, and 62 are allowable over the cited art and that the subject application is now in condition for allowance.

The fact that applicants may not have specifically traversed any particular assertion by the Office should not be construed as indicating applicant's agreement therewith.

The Commissioner is hereby authorized to charge any required government fees to Deposit Account No. 07-0846.

Respectfully submitted,

/Frank R. Agovino/

Frank R. Agovino, Reg. No. 27,416
SENNIGER POWERS
One Metropolitan Square, 16th Floor
St. Louis, Missouri 63102
(314) 231-5400

FRA/caa